REMARKS

Claims 1, 2, 4, 8 – 10, 12, and 16 – 18 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Pat. Publ. No. 2003/0067687 ("Barton"); Claims 5 – 7, 13 – 15, and 19 stand rejected under 35 U.S.C. §103(a) as unpatentable over Barton; and Claims 27 – 29 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. Publ. No. 2002/0186926 ("Hoose") in view of Barton.

The independent claims have been amended to limit the average height h and average width w of the protrusions recited in the claims so that h/a is between 0.84 and 0.96 and w/a is between 0.22 and 0.3. These limitations were originally presented in dependent claims 7, 15, 19, and 29, so those claims have been canceled as well as claims that recited intermediate height and width ranges.

The portion of the Office Action that is relevant to the amended claims is thus that portion stating that "[i]t would have been obvious to one having skill in the art to adjust either a, h, or w such that w/a is between 0.22 and 0.30 and h/a is between 0.84 and 0.96" (Office Action, ¶14). This assertion is based on case law holding that "discovering the optimum or workable ranges involves only routine skill in the art" (*id.*, ¶14, *citing In re Aller*, 105 USPQ 233, 235). There is, however, significant evidence provided in the application as filed that illustrates criticality of the combination of ranges now claimed:

> Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variation within the claims.... In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." (MPEP 2144.05.III, *citations omitted*).

In particular, attention is drawn to the simulation results provided in the application in Figs. 3B and 3C. These drawings respectively show the results of calculating the efficiency and polarization-dependent loss over a range of heights and widths. There is no *a priori* reason to expect that high efficiency of the diffraction grating should be correlated with low polarization-dependent loss, and yet these drawings show just such an unexpected criticality.

This criticality is manifested by the *simultaneous* achievement of high efficiency (in both S and P polarizations) with low polarization-dependent loss. The following language discussing this criticality in the application notes its fortuity and unexpectedness:

> It is evident that in the same ranges discussed above that the PDL is small, generally less than 1.0 dB, and rapidly decreases to even smaller values so that the PDL is less than 0.2 dB approximately in the region where $0.84 < h/a < 0.96$ and $0.22 < w/a < 0.3$. Fortuitously, this region of very low PDL overlaps entirely the region in which the average efficiency exceeds 90%. Accordingly, embodiments of the invention unexpectedly permit the use of a lamellar reflective diffraction grating to achieve simultaneously an average efficiency that exceeds 90% and a PDL less than 0.2 dB.
> (Application, p. 9, ll. 5 – 12).

These statements, as well as the underlying data illustrating the criticality of the claimed ranges, are supported by the Declaration made by applicants when the application was filed and, as such, are entitled to the strong evidentiary weight afforded to statements made under an acknowledgment of the penalties set forth in 18 U.S.C. §1001.

This criticality is sufficient to rebut the argument set forth in the Office Action, particularly when a comparison is made of the discussion that is provided in Barton. Notably, Barton never meaningfully considers the possibility of simultaneously achieving high efficiency and low polarization-dependent loss. While Figs. 4 – 7 of Barton show graphs illustrating the dependence of the loss on wavelength, depth variation, duty cycle, and incidence angle, there is a conspicuous lack of discussion of the effects on efficiency. Barton comments only that "a grating can be produced that has near 100% diffraction efficiency over a reasonable wavelength bandwidth, independent of the polarization of the incident beam" (Barton, ¶13), without ever specifying what is meant by "near 100%." It certainly provides no suggestion that especially high efficiency may be achieved simultaneously with low polarization-dependent loss.

Furthermore, the results that are presented in Barton teach away from the ranges now recited in the claims, a factor that also acts to rebut the argument set forth in the Office Action:

> A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention.

(MPEP 2144.05.III).

Specifically, Fig. 6 of Barton shows the dependence of loss on "duty cycle," which corresponds to w/a. The minimum loss shown in this figure achieved for the TE polarization (i.e., P polarization) is achieved at about a duty cycle of about 0.44 with the loss for the TM polarization (i.e., S polarization) being generally small over the range shown. The specific example discussed in ¶28 of Barton uses a duty cycle very close to what produces this minimum in TE loss. Notably, not only is this value of 0.44 significantly outside the claimed range for w/a of 0.22 – 0.3, the claimed range is not even considered as possibility in Fig. 6. Barton is clearly teaching the use of duty cycles close to the 0.44 value about which Fig. 6 is centered. By completely excluding the claimed range from its consideration, Barton is clearly teaching away from the range that is now claimed.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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